

Are There Sufficient ACGME-Accredited GME Positions Leading to Eligibility for Initial Board Certification to Absorb UME Growth in the United States?

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Undergraduate medical education (UME) in the United States has undergone dramatic expansion over the past 22 years. In the spring of 2001, MD-granting schools graduated 15 793 physicians,¹ and DO-granting schools graduated 2510 physicians,² for a total of 18 303 domestic graduates. In the spring of 2023, MD-granting schools graduated 20 920, and DO-granting schools graduated 7895 physicians, for a total of 28 779 domestic graduates, an increase of 10 476 domestic graduates (57.2%) (see FIGURE 1).

Concern has been raised that there are inadequate numbers of entry-level positions in Accreditation Council for Graduate Medical Education (ACGME)-accredited graduate medical education (GME) positions relative to the increasing number of domestic graduates of allopathic and osteopathic medical education in the United States. While increasing the output of UME was necessary, it was not sufficient to increase the output of the medical education pipeline. GME expansion would also be required to bring more graduates to eligibility for licensure and initial certification. Great concern was raised that, in the absence of expansion of Medicare-funded GME positions (capped at 1998 levels by the Balanced Budget Act), GME would be unable to expand sufficiently to absorb the flow of domestic graduates.³

The result is escalating numbers of applications by graduating medical students who are fearful of not “matching,” preoccupation with licensing examination score performance impacting the curriculum and test preparation, as well as a fundamental shift in security of the availability of GME positions upon successful completion of the UME curriculum.

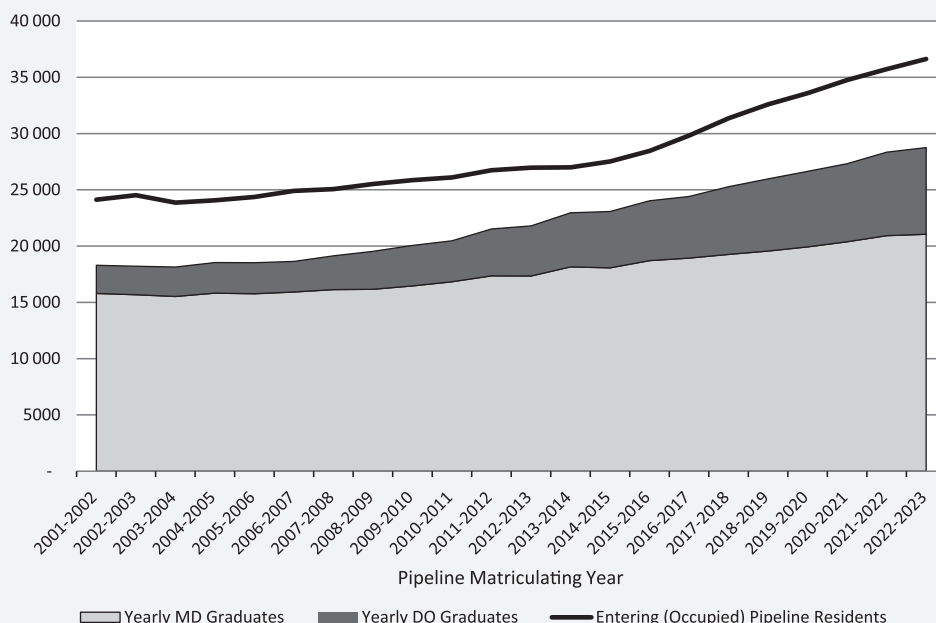
During the summer of 2001, 24 129 physicians⁴ entered the first year of ACGME-accredited training in a discipline leading to initial certification in a

primary specialty by either an American Board of Medical Specialties (ABMS) or an American Osteopathic Association (AOA) certifying board. During the summer of 2022, 36 628 physicians entered the first year of training in specialties leading to initial certification by either ABMS or AOA member boards, an increase of 12 499 occupied positions (51.8%). These numbers are confounded in that previously AOA-approved residency positions in 2001-2002 are not counted in the ACGME positions leading to initial certification, while all osteopathic graduates are counted in the graduation numbers. Similarly, a subset of positions accredited prior to 2015 by the AOA are present in the 2023 ACGME count due to the creation of the single accreditation pathway for GME in 2015 but are not counted in the 2009 numbers. It is estimated that the net increase in ACGME-accredited GME initial year positions leading to initial certification occupied from 2001 to 2023 is approximately 11 000, an increase of 45% (see FIGURE 1).

One way to examine the impact of expansion of these 2 phases of the continuum of medical education on graduating medical students is to calculate the number of positions available (using the actual number of positions filled in the subsequent academic year as a measure of GME capacity) versus the total number of graduates in a given year. FIGURE 2 demonstrates this calculation for the past 22 academic years (2001-2023) and shows how each year there is a significant excess of occupied positions over the total number of domestic MD and DO graduates. This occupied excess capacity is filled by international medical graduates. If one then examines the difference between domestic graduates and the total number of filled positions, one observes that the difference over time has not been constant (see FIGURE 2). As can be seen in this graphic, the difference between total filled pipeline positions and total domestic graduates reached a nadir in 2013-2014, with a surplus of positions of only 4043, a distinct drop from the previous surplus of 5000 to 6000 positions. One then sees a jump of approximately 1500 positions in 2016-2017, representing

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**FIGURE 1**

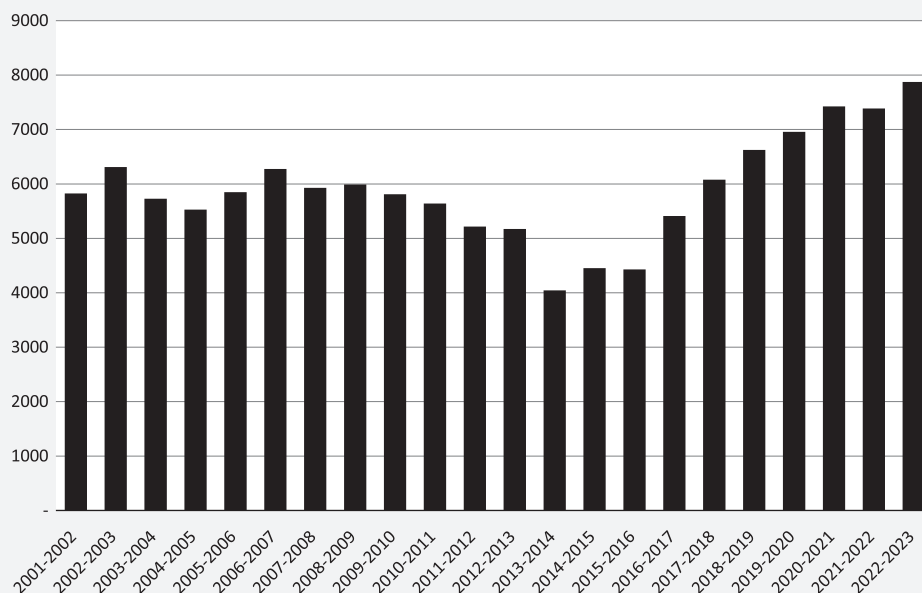
MD Graduates, DO Graduates, and Total Occupied Entry-Year Positions in ACGME-Accredited Specialty Programs (Pipeline Programs)

Abbreviation: ACGME, Accreditation Council for Graduate Medical Education.

Data sources: Association of American Medical Colleges,¹ Association of Colleges of Osteopathic Medicine,² ACGME.⁴

the accreditation of previously AOA-approved residency programs and positions. Interestingly, the difference continues to widen, despite continued growth of the UME graduate pool, implying a greater rate of

growth of pipeline positions than domestic MD and DO graduates during the past 7 years, reaching its highest number of excess positions over the past 24 years at 7875 occupied positions. This growth in positions has

**FIGURE 2**

Occupied Entry-Level Pipeline Positions in Excess of Domestic MD and DO Graduates

Data sources: Association of American Medical Colleges,¹ Association of Colleges of Osteopathic Medicine,² Accreditation Council for Graduate Medical Education.⁴

TABLE 1
Number of Residents Entering Programs Leading to Initial Specialty Certification (ACGME Pipeline Programs)

Specialty	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	Delta 2009-2023, a n (%)
Overall	25 506	25 865	26 107	26 737	26 974	27 004	27 534	28 456	29 826	31 355	32 603	33 594	34 754	35 729	36 628	11 122 (43.6)
Anesthesiology	1613	1358	1293	1268	1310	1322	1326	1355	1408	1458	1545	1602	1627	1689	1695	82 (5.1)
Dermatology	368	386	390	410	408	416	438	460	472	499	535	534	531	539	549	181 (49.2)
Emergency medicine	1474	1613	1707	1738	1799	1826	1877	1959	2186	2412	2536	2666	2780	2936	3010	1536 (104.2)
Family medicine	3208	3233	3318	3422	3456	3505	3578	3663	3875	4218	4563	4737	4925	5020	5121	1913 (59.6)
Internal medicine	6831	7150	7110	7312	7274	7250	7479	7801	8246	8716	8971	9242	9628	9949	10260	3429 (50.2)
Medical genetics and genomics	39	40	40	41	36	33	35	36	35	37	28	37	32	40	34	5 (-12.8)
Neurological surgery	162	210	193	199	202	207	206	212	220	220	230	231	233	236	242	80 (49.4)
Neurology	562	611	624	637	631	664	679	735	751	824	859	868	924	968	1025	463 (82.4)
Child neurology									123	132	134	140	141	168	169	169 (137.4)
Nuclear medicine	57	80	70	53	45	42	42	39	22	30	32	39	33	38	37	20 (-35.1)
Obstetrics and gynecology	1203	1223	1252	1267	1265	1221	1258	1295	1340	1373	1400	1442	1481	1499	1543	340 (28.3)
Ophthalmology	451	481	483	468	469	473	477	482	476	491	497	504	518	523	524	73 (16.2)
Orthopaedic surgery	681	706	705	718	716	710	729	747	765	806	837	883	895	907	897	216 (31.7)
Osteopathic neuromusculoskeletal medicine								2	5	8	15	3	12	16	15	15 (750)
Otolaryngology-head and neck surgery	290	294	292	296	313	303	304	312	318	327	340	350	348	361	380	90 (31)
Pathology-anatomic and clinical	605	643	626	631	619	626	617	630	606	626	620	611	606	618	644	39 (6.4)
Pediatrics	2731	2740	2815	2957	2977	2962	2994	2988	3062	3078	3105	3139	3159	3156	3214	483 (17.7)
Physical medicine and rehabilitation	390	360	346	349	348	348	352	363	370	395	401	412	422	450	456	66 (16.9)
Plastic surgery		149	148	141	149	134	128	103	85	77	75	71	66	67	68	68 (45.6)

TABLE 1
Number of Residents Entering Programs Leading to Initial Specialty Certification (ACGME Pipeline Programs) (continued)

Specialty	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	Delta 2009-2023, ^a n (%)
Plastic surgery-integrated	62	66	68	72	101	118	127	147	151	155	170	172	177	194	196	134 (216.1)
Public health, general preventive medicine ^b	145	153	151	187	194	166	178	199	194	195	193	175	172	190	182	37 (25.5)
Psychiatry	1321	1289	1297	1329	1355	1402	1378	1452	1552	1660	1766	1875	1964	2051	2146	825 (62.5)
Radiation oncology	138	151	162	189	192	178	189	191	194	193	196	192	202	185	186	48 (34.8)
Radiology-diagnostic	1117	1172	1188	1180	1193	1162	1172	1219	1214	1204	1131	1142	1156	1158	1153	36 (3.2)
Interventional radiology-independent													149	125	130	130 (87.2)
Interventional radiology-integrated									2	20	118	139	154	148	160	160 (8000)
Surgery	1451	1096	1158	1164	1188	1203	1210	1271	1335	1396	1478	1524	1565	1611	1681	230 (15.9)
Vascular surgery-integrated	7	20	26	31	44	48	54	57	58	60	61	68	76	80	86	79 (1128.6)
Thoracic surgery-integrated	2	5	11	16	21	25	33	35	35	35	36	36	35	47	46	44 (2200)
Urology	264	269	271	292	302	294	302	323	333	333	343	372	360	373	385	121 (45.8)
Internal medicine/pediatrics	334	369	363	370	367	366	372	380	393	377	388	388	383	387	394	60 (18.0)

^a Delta calculated from 2009 baseline, or year of inception. Data source: ACGME.⁴

^b Public health and general preventive medicine, aerospace medicine, and occupational and environmental medicine separated in 2022-2023; totaled under public health and general preventive medicine in this analysis.

Abbreviation: ACGME, Accreditation Council for Graduate Medical Education.

Note: Single Accreditation System initiated in 2015-2016.

been accomplished through both expansion of existing program positions, as well as development of new programs (data not shown).

In order to examine more specifically the nature of position growth, the growth of specialty positions was examined. TABLE 1 demonstrates the growth of each specialty leading to initial certification (pipeline specialties) over the past 15 years, from 2009 to

2023, and shows that overall growth in positions was significant, increasing from 25 506 positions filled to 36 628 positions filled (11 122, 43.6%). All specialties but 2 (medical genetics and genomics [-5, -12.8%] and nuclear medicine [-20, -35.1%]) increased their resident complement. Emergency medicine increased by 1536 positions, or 104.2%, and plastic surgery also more than doubled the number of

TABLE 2

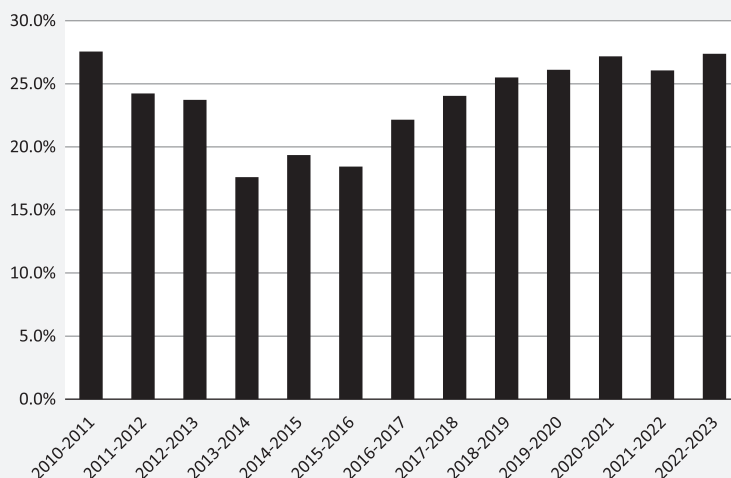
Specialty Distribution by Current Share of Pipeline Specialty Entry Level Positions, 2023 vs 2009

Specialty	Baseline (2009) Distribution, %	Current (2023) Distribution, %	Delta % Distribution, %	Delta Positions Filled 2023-2009, n
Overall	100	100	0	11 122
Internal medicine	26.8	28	1.2	3429
Family medicine	12.6	14	1.4	1913
Pediatrics	10.7	8.8	-1.9	483
Emergency medicine	5.8	8.2	2.4	1,536
Psychiatry	5.2	5.9	0.7	825
Anesthesiology	6.3	4.6	-1.7	82
Surgery	5.7	4.6	-1.1	230
Obstetrics and gynecology	4.7	4.2	-0.5	340
Radiology-diagnostic	4.4	3.1	-1.2	36
Interventional radiology-integrated	0	0.4	0.4	160
Interventional radiology-independent	0	0.4	0.4	130
Neurology	2.2	2.8	0.6	463
Orthopaedic surgery	2.7	2.4	-0.2	216
Pathology-anatomic and clinical	2.4	1.8	-0.6	39
Dermatology	1.4	1.5	0.1	181
Ophthalmology	1.8	1.4	-0.3	73
Physical medicine and rehabilitation	1.5	1.2	-0.3	66
Internal medicine/pediatrics	1.3	1.1	-0.2	60
Urology	1	1.1	0	121
Otolaryngology-head and neck surgery	1.1	1	-0.1	90
Neurological surgery	0.6	0.7	0	80
Plastic surgery-integrated	0.2	0.5	0.3	134
Plastic surgery	0	0.2	0.2	68
Radiation oncology	0.5	0.5	0	48
Public health, general preventive medicine ^a	0.6	0.5	-0.1	37
Child neurology	0	0.5	0.5	169
Vascular surgery-integrated	0	0.2	0.2	79
Thoracic surgery-integrated	0	0.1	0.1	44
Nuclear medicine	0.2	0.1	-0.1	-20
Medical genetics and genomics	0.2	0.1	-0.1	-5
Osteopathic neuromusculoskeletal medicine	0	0	0	15

^a Public health and general preventive medicine, aerospace medicine, and occupational and environmental medicine separated in 2022-2023; totaled under public health and general preventive medicine in this analysis.

Data source: ACGME.⁴

Note: Shaded specialties demonstrate a drop in relative size, 2023 vs 2009; Specialties sorted based on 2023 distribution.

**FIGURE 3**

Entry-Level Positions Filled in Pipeline Specialty Programs in Excess of Number of Domestic MD and DO Graduates, Percentage

Data sources: Association of American Medical Colleges,¹ Association of Colleges of Osteopathic Medicine,² Accreditation Council for Graduate Medical Education.⁴

occupied entry level positions. The largest numeric growth in specialty programs occurred in internal medicine (3429, 50.2%) and family medicine (1913, 59.6%). Psychiatry grew significantly over this period (825, 62.5%). In contrast, pediatrics increased positions only by 483 (17.7%). All of the surgical disciplines demonstrated growth in positions, with neurological surgery (80, 49.4%), obstetrics and gynecology (340, 28.3%), otolaryngology (90, 31%), orthopedic surgery (216, 31.7%), plastic surgery (202, 326%), surgery (230, 15.9%), and urology (121, 45.8%) all demonstrating significant growth. The net result of this heterogeneous growth was a reshuffling of the makeup of the GME distribution of positions filled by specialty. The distribution of pipeline specialty entry-level complement can be seen in TABLE 2.

The net impact of these changes would indicate that the surplus of GME positions in programs leading to initial certification in relation to the number of domestic graduates is being restored. FIGURE 3 demonstrates that despite the ongoing growth of domestic UME graduates, the relative excess of positions available and occupied has regained, and remains greater than 25%, similar to the relative excess prior to the expansion of UME over the past 20 years. All specialties leading to initial board certification other than medical genetics and genomics and nuclear medicine have expanded, with overall expansion of 44%. With the exceptions of neurological surgery, plastic surgery, and urology, the surgical discipline expansion has been slightly below the overall rate, and the medical disciplines (with the exception of pediatrics) have grown slightly above the overall rate, likely resulting in a heterogeneous

impact on medical students, depending on their specialty of interest.

Summary

Expansion of UME has been met with the expansion of GME in roughly similar proportions, although the GME expansion initially lagged the expansion in UME, resulting in a compression of opportunities in the middle of the previous decade. The single accreditation system permits the ACGME to provide precise quantification of the nation's GME pipeline. Sponsoring institutions and programs have responded admirably in creation of GME programs and positions to meet the needs of the American public.⁵ While this expansion now is sized to meet the needs of graduating domestic medical students in a fashion similar to its configuration prior to UME expansion, its impact on students would be predicted to be heterogeneous. Finally, it is unclear whether the health care delivery system can continue to maintain or expand its support of the GME phase of the continuum. UME expansion has not yet plateaued, and continued GME expansion will be required in order to provide not only domestic graduates, but also international graduates the opportunity to benefit from education in ACGME-accredited residency programs and achieve certification in the specialty of their choice. Continued GME expansion will also be required to meet the needs of the American public.⁵

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